

## Claims

- [c1] 1.A method for fragmenting an incoming packet for transmission as a first outgoing packet and a second outgoing packet, the method comprising:  
storing a payload of the incoming packet in a plurality of storage units beginning in a first storage unit;  
transmitting the first outgoing packet being formed according to a predetermined portion of the payload stored in the first storage unit; and  
after transmitting the first outgoing packet, transmitting the second outgoing packet being formed according to a remaining portion of the payload stored in the storage units.
- [c2] 2.The method of claim 1, wherein the first and second outgoing packets are Point-to-Point Protocol over Ethernet (PPPoE) frames.
- [c3] 3.The method of claim 1, further comprising:  
generating a first outgoing sub-header according to a header of the incoming packet and the predetermined portion of the payload stored in the first storage unit;  
generating a second outgoing sub-header according to the header of the incoming packet or the first outgoing

sub-header, and the remaining portion of the payload; including the first outgoing sub-header and the predetermined portion of the payload stored in the first storage unit in the first outgoing packet; and including the second outgoing sub-header and the remaining portion of the payload stored in the storage units in the second outgoing packet.

- [c4] 4. The method of claim 3, wherein the incoming packet is an Internet Protocol (IP) packet and the header of the incoming packet is the IP header of the incoming IP packet.
- [c5] 5. The method of claim 4, wherein the first outgoing sub-header is a first IP header corresponding to the predetermined portion of the payload stored in the first storage unit and the incoming IP header, and the second outgoing sub-header is a second IP header corresponding to the remaining portion of the payload, and the incoming IP header or the first outgoing sub-header.
- [c6] 6. The method of claim 4, wherein generating the first outgoing sub-header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming IP header according to the predetermined portion of the payload stored in the first storage unit.
- [c7] 7. The method of claim 4, wherein generating the second

outgoing sub-header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming packet IP header or the first outgoing sub-header according to the remaining portion of the payload stored in the storage units.

- [c8] 8.The method of claim 3, wherein the first outgoing sub-header and the first fragment are included as a first outgoing payload of the first outgoing packet, and wherein the second outgoing sub-header and the second fragment are included as a second outgoing payload of the second outgoing packet.
- [c9] 9.A method for fragmenting an incoming packet for inclusion in a first outgoing packet and a second outgoing packet, the method comprising:
  - storing a payload of the incoming packet as a first fragment and a second fragment in a plurality of storage units, wherein the first fragment is stored within a single storage unit;
  - including the first fragment in the first outgoing packet; and
  - after including the first fragment in the first outgoing packet, including the second fragment in the second outgoing packet.
- [c10] 10.The method of claim 9, wherein the incoming packet

is an Internet Protocol (IP) packet received in an Ethernet frame and the first and second outgoing packets are Point-to-Point Protocol over Ethernet (PPPoE) frames.

- [c11] 11. The method of claim 9 further comprising:  
generating a first outgoing sub-header and a second outgoing sub-header according to the first fragment, the second fragment, and a header of the incoming packet;  
including the first outgoing sub-header in the first outgoing packet; and  
including the second outgoing sub-header in the second outgoing packet.
- [c12] 12. The method of claim 11, wherein the incoming packet is an incoming Internet Protocol (IP) packet and the header of the incoming packet is the IP header of the incoming IP packet.
- [c13] 13. The method of claim 12, wherein the first outgoing sub-header is a first outgoing IP header generated corresponding to the first fragment and the IP header of the incoming IP packet, and the second outgoing sub-header is a second outgoing IP header generated corresponding to the second fragment, and the IP header of the incoming IP packet or the first outgoing sub-header.
- [c14] 14. The method of claim 12, wherein generating the first

outgoing sub-header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming packet IP header according to the first fragment.

- [c15] 15. The method of claim 12, wherein generating the second outgoing sub-header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming packet IP header or the first outgoing sub-header according to the second fragment.
- [c16] 16. The method of claim 11, wherein the first outgoing sub-header and the first fragment are included in a payload of the first outgoing packet, and wherein the second outgoing sub-header and the second fragment are included in a payload of the second outgoing packet.
- [c17] 17. A method for fragmenting an IP packet for transmission as first and second Point-to-Point Protocol over Ethernet (PPPoE) frames, the method comprising:  
storing a payload of the IP packet as a first fragment and a second fragment in a plurality of storage units, wherein the first fragment is stored within a single storage unit;  
transmitting the first PPPoE frame having a payload including the first fragment; and  
after transmitting the first PPPoE frame, transmitting the second PPPoE frame having a payload including the second fragment.

[c18] 18. The method of claim 17, further comprising:

- modifying an incoming IP header of the IP packet according to the first fragment to form a first outgoing IP header;
- modifying the incoming IP header or the first outgoing IP header according to the second fragment to form a second outgoing IP header;
- including the first outgoing IP header in the payload of the first PPPoE frame; and
- including the second outgoing IP header in the payload of the second PPPoE frame.

[c19] 19. The method of claim 18, wherein modifying the incoming IP header of the IP packet according to the first fragment to form the first outgoing IP header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming IP header according to the first fragment; and

wherein modifying the incoming IP header or the first outgoing IP header according to the second fragment to form the second outgoing IP header comprises modifying the MF, Offset, Length, and Checksum fields of the incoming IP header or the first outgoing IP header according to the second fragment.